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(56) Documents cited

GB 2152838 A GB 1550415 A GB 1537034 A
GB 1046787 A GB 0526178 A GB 0412221 A

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(54) A waste gas-purifying device

(57) A waste gas purifying device employing an intermediate exhaust fan (11) and a pump (3) to suck the waste gas flowing through a chimney (2) into at least one washing tank (4). The washing tank contains a washing liquid which can remove the particles or toxic gas in the waste gas, the purified gas being then discharged back to the chimney via line (5). More than one washing tank may be used. The chimney may have throttle (21) to guide gas to the washing system.

Bubble breaker (44) is provided adjacent to the end of the gas inlet pipe in tank (4) to produce fine bubbles and hence better contact.

The liquid in the tank may be sodium carbonate for removing oily or acidic contaminants.

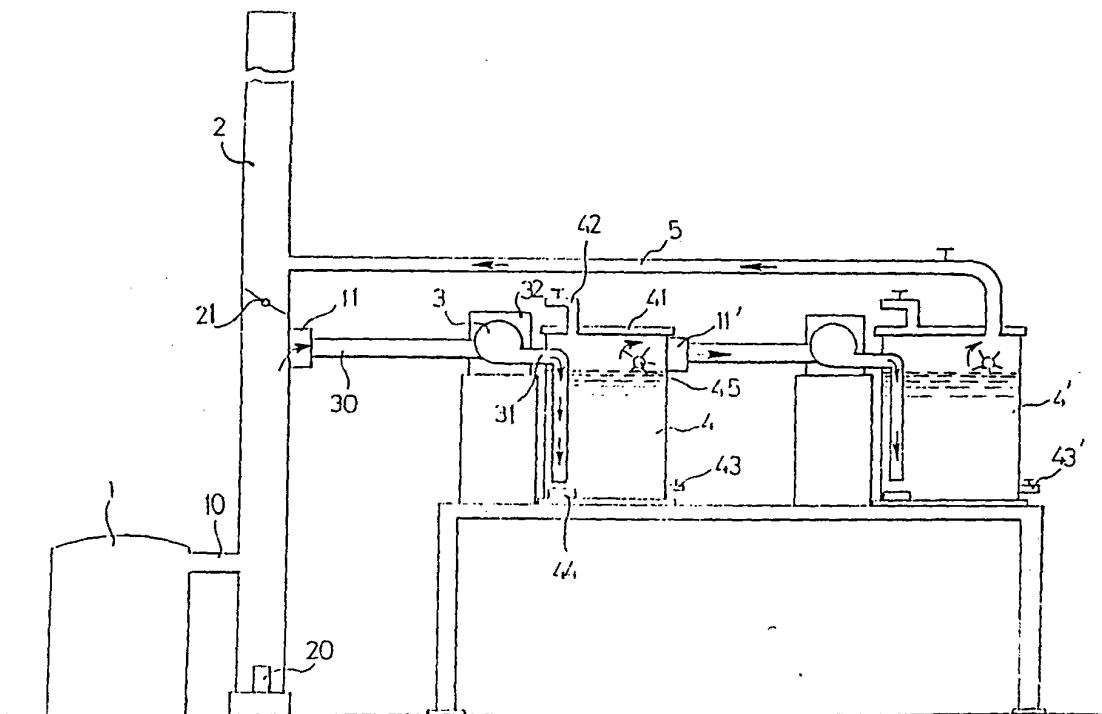
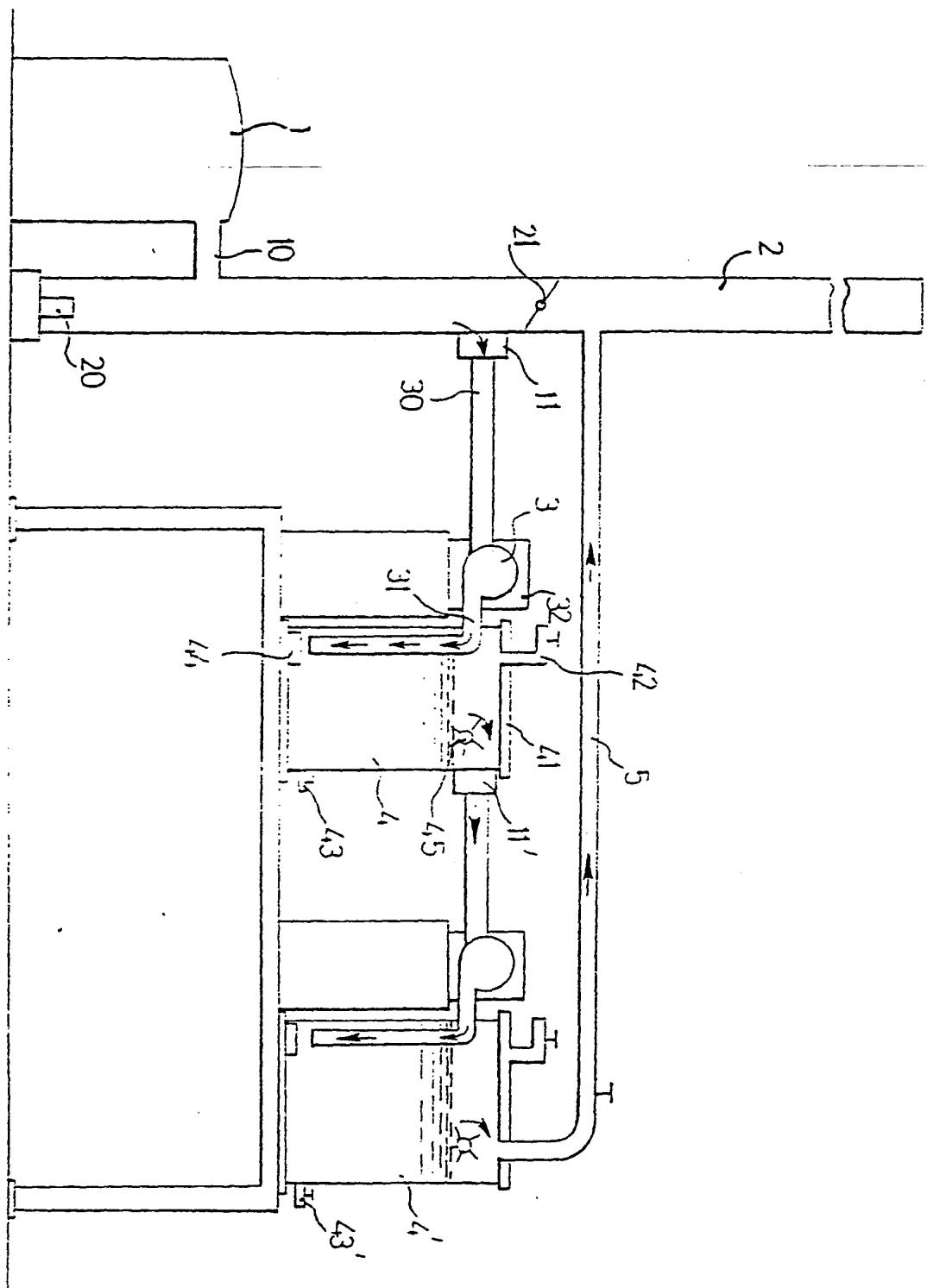


FIG. 1

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FIG. 2

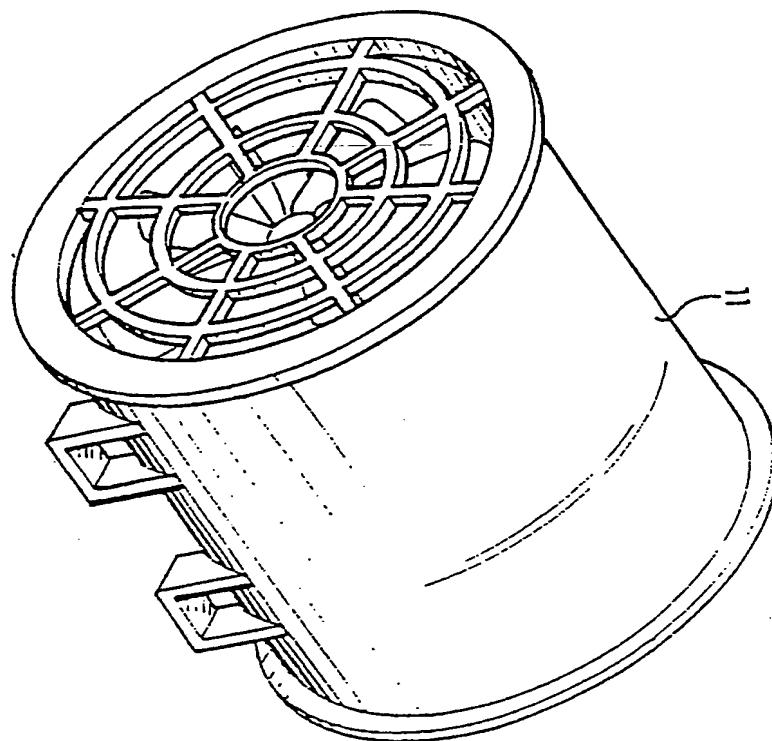


FIG. 3

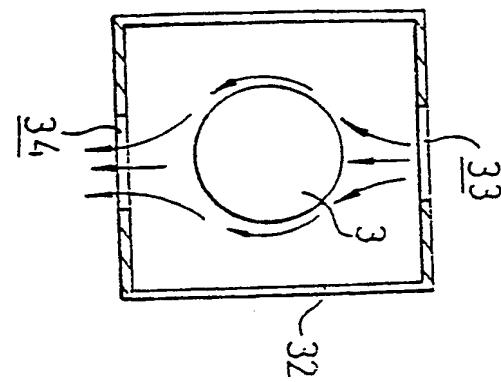


FIG. 4

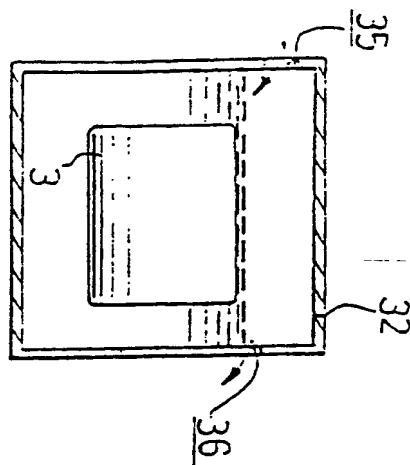


FIG. 5

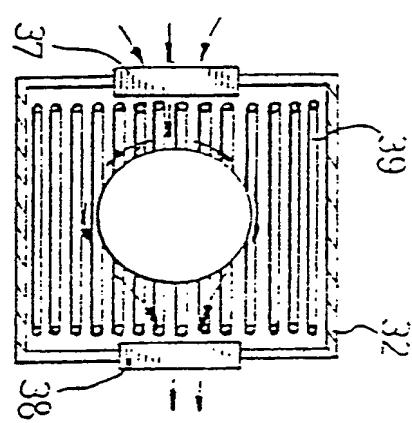
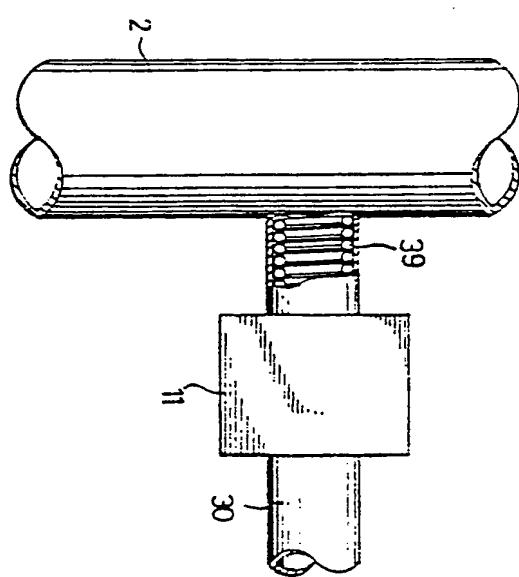


FIG. 6



A WASTE GAS-PURIFYING DEVICE

The present invention relates to a waste gas-purifying device suitable for industrial, family, or even automobile, autobike use, especially for diesel oil-burning devices which produce high concentrations of waste gas.

In modern life, the quality of the environment is strictly required and the managements of air pollution, waste water and garbage have become very important affairs about which everybody is concerned. In connection with air pollution, since waste gas is easy to spread and directly contact the human body, people are much more worried about this problem. Therefore, various air-purifying devices have been developed to eliminate the problem of air pollution. However, most such conventional devices have a complicated structure and the price and maintenance cost thereof are very high. Moreover, their purifying effect is limited and cannot meet requirements. As a consequence, the rate of use of conventional air-purifying device is low.

In accordance with the present invention, a waste gas purifying device comprises means for drawing waste gas from a waste gas source; a washing tank connected to the waste gas drawing means by a discharge pipe, wherein the discharge pipe guides the waste gas into the washing tank, the washing tank containing a washing liquid in use, and wherein a discharge opening of the discharging pipe is located adjacent to the bottom of the washing tank; and a bubble breaker disposed on the bottom of the washing tank opposite the discharge opening of the discharging pipe.

This waste gas-purifying device is suitable for industrial, family, or even automatic, autobike use. In one example when waste gas is produced, an intermediate exhaust fan and vacuum pump are used to guide the waste gas into a washing tank for filtration and sedimentation process. The _____

washing tank contains a washing liquid which can be clean water or chemical agent capable of sufficiently mixing and reacting with the waste gas and minimizing the content of undesired components. The purified gas is then discharged
5 into the ambient air. The present device is simply constructed and easy to be operated and the price and operating expense thereof are low. The device is suitable for general factory and family and can also serve as a pre-processing device of a large type of waste gas-processing
10 equipment.

The present invention can be best understood through the following description and accompanying drawings wherein

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Fig. 1 is a plane view of the present invention;

Fig. 2 is a perspective view of the intermediate
20 exhaust fan of this invention;

Fig. 3 shows the sprinkling type of the cooling device for the vacuum pump thercof;

Fig. 4 shows the immersing type of the cooling device for the vacuum pump thereof;

25 Fig. 5 shows the cooling air type of the cooling device for the vacuum pump thereof; and

Fig. 6 shows the condensing pipe of the cooling device disposed in front of the vacuum pump.

30

Please first refer to Fig. 1. The waste gas-purifying device of this invention includes a vacuum pump 3, a
35 washing tank 4 and a chimney 2. The waste gas can be forced into the washing tank 4 by the air pressure produced by the vacuum pump 3 for the purifying purpose. The chimney 2

is disposed beside the waste gas source 1 and communicated therewith by an exhausting pipe 10 so that the waste gas can directly enter the chimney 2. A stopper board 21 is disposed inside the chimney 2 for controlling the opening/closing of the passage of the chimney 2. An ash exit 20 is formed at the lower portion of the chimney 2 for cleaning up the chimney 2.

An in-coming pipe 30 is connected with the chimney 2 under the stopper board 21 and an intermediate exhaust fan 10 11 is disposed on the in-coming pipe 30. The exhaust fan 11 can be of axial flow type as shown in Fig 2 or of other suitable type for exhausting the waste gas in the chimney 2. The vacuum pump 3 is located at a position spaced from the exhaust fan 11 by a suitable distance. A discharging pipe 31 of the pump 3 is extended into the bottom of the washing tank 4. The lower end of the discharging pipe 31 is spaced from a bubble breaker 44 by a suitable distance. A cover 41 is disposed on the top of the washing tank 4 and a washing liquid introducing pipe 42 is provided on the 15 cover 41 for supplementing the washing liquid. A drain pipe 43 is disposed one side of the lower portion of the washing tank 4. A stirring propeller 45 is located in the tank 4 for directly stirring the washing liquid, making the same better mixed with the air or the guided in waste gas.

25 According to the above arrangement, when the waste gas is produced from the waste gas source 1, it enters the chimney 2 and is stopped by the stopper board 21. At this time, the intermediate exhaust fan 11 is activated to suck the waste gas and the vacuum pump 3 is powered on to 30 pressurize the waste gas, making the waste gas go through the in-coming pipe 30 and discharging pipe 31 and go into the washing liquid from the lower portion of the washing tank 4. Because the temperature of the waste gas is very high, therefore, under a long period of effect of high 35 temperature, the insulating rubber surrounding the coil of the motor in the vacuum pump 3 may be molten to cause short -circuit and damage thereof. Therefore, the vacuum pump 3

is provided with a heat-dissipating system to protect the motor. The heat-dissipating system can be of sprinkling type, immersing type or cooling air type as shown respectively in figs. 3, 4 and 5. These three types each include a housing 32 enveloping the vacuum pump 3, wherein the housing 32 of sprinkling type is formed with a water inlet 33 on one side and a water outlet 34 on the other side, whereby water with low temperature directly flows through the inlet 33 into the housing 32 to contact the periphery of the vacuum pump 3 so that the heat is absorbed by the cold water and carried away from the vacuum pump 3. The water then flows through the outlet 34 outside the housing 32. Referring to Fig. 4, in the immersing type, the vacuum pump 3 is immersed in a heat-dissipating flowing liquid which flows into the housing 32 through the inlet 35 to carry away the heat from the vacuum pump 3 and then discharges from the outlet 36. Referring to Fig. 5, in the cooling air type, an exhaust fan 37 is disposed on one side of the housing 32 to blow cold air into the housing 32 to directly contact the vacuum pump 3 and absorb the heat thereof. The hot air is then discharged from the housing 32 by another fan 38 located on the other side of the housing 32. In addition, a condensing pipe 39 is disposed in the housing 32 to enhance the heat-dissipating effect. As a consequence, the motor and other components of the vacuum pump 3 can be maintained at a normal working temperature and the possibility of damage can be minimized. Moreover, as shown in Fig. 6, a condensing pipe 39 can be disposed in the in-coming pipe 30 in front of the intermediate exhausting fan 11 to previously lower the temperature of the waste gas entering the in-couring pipe 30 so that the waste gas going into the vacuum pump 3 will be at a lower temperature to ensure the normal operation of the vacuum pump 3.

The bubble breaker 44 is used to break the waste gas bubbles in the washing tank 4 into many smaller bubbles so that the waste gas can more sufficiently contact with

the washing liquid. The distance between the discharging pipe 31 and the bubble breaker 44 depends on the compositions and varieties of the waste gas so that the waste gas bubbles can most sufficiently mix with and react with the washing liquid for achieving better purifying effect. Moreover, on the surface of the washing liquid, the stirring propeller 45 is used to stir the washing liquid, making the same more sufficiently mixed with the air so that a more clean gas can be obtained. The number of the washing tanks 4 can be increased, depending on the compositions and contaminating degree of the waste gas.

The second washing tank 4' is almost identical to the first one in structure but one difference between them is that the intermediate exhaust fan 11' and vacuum pump 3' of the second washing tank 4' are used to suck the not so dirty waste gas coming from the first washing tank 4. Another difference is that the washing liquid contained in the second washing tank 4' may be different from that of the first washing tank 4. Generally, the washing liquid of the first one may be clean water for removing larger particles or water-soluable gas, while the washing liquid of the second one may be sodium carbonate aqueous solution for absorbing and dissolving carbon oil component or other acidic gas components. However, the selection of washing liquid is not specifically limited. In case of burning general garbage, the washing liquids of two washing tanks can be both clean water and in case of waste gas with high oil content, the washing liquids can be both carbonate aqueous solution. Other solutions with even better cleaning effect can also be adopted, and the number of the washing tanks can be two, three, four, etc., depending on the compositions and characters of the waste gas.

After a period of use, the washing liquid can be discharged from the draining pipes 43, 43' for other treatment. Some toxin and dirt can be burned or concentrated or neutralized by neutralizer.

According to the above arrangement, the waste gas-

purifying device of this invention is simply structured and can be easily maintained and suitable for general factories, families automobiles or construction sites. In case a long pipe line is required, additional exhaust fans 5 can be provided at suitable intervals to enhance the flowing of waste gas and speed the purifying process.

When the present device needs to be repaired or fails, the stopper board 21 can be opened to discharge the waste gas so as to prevent other relevant machines from stopping.

CLAIMS

1. A waste gas-purifying device comprising means for drawing waste gas from a waste gas source; a washing tank connected to the waste gas drawing means by a discharge pipe, wherein the discharge pipe guides the waste gas into the washing tank, the washing tank containing a washing liquid in use, and wherein a discharge opening of the discharging pipe is located adjacent to the bottom of the washing tank; and a bubble breaker disposed on the bottom of the washing tank opposite the discharge opening of the discharging pipe.
5
2. A device as claimed in claim 1, further comprising a stirring propeller positioned so as to be disposed on the surface of the washing liquid contained in the washing tank
10
3. A device as claimed in claim 1 or claim 2, wherein the bubble breaker is disposed adjacent to and opposite the discharge opening of the discharging pipe.
15
4. A device as claimed in any of claims 1 to 3, wherein the washing tank is provided with a guide pipe which guides purified gas to an exhaust outlet.
20
5. A device as claimed in any of claims 1 to 4, wherein several washing tanks are disposed in series and connected such that gas from one tank is fed to the next downstream
25
6. A device as claimed in any of the preceding claims, wherein an exhaust fan is disposed upstream of the waste gas drawing means.
30
7. A device as claimed in any of the preceding claims, wherein the waste gas drawing means is provided with a cooling device.
35
8. A device as claimed in claim 7, wherein the cooling device is disposed at the inlet of an in-coming pipe connected to the waste gas drawing means.

9. A device according to any of the preceding claims, wherein the waste gas drawing means comprises a vacuum pump.
10. A device according to any of the preceding claims,
5 further comprising a chimney connected in use to a waste gas source, the waste gas drawing means being arranged to draw waste gas from the chimney upstream of the chimney outlet..
11. A device according to claim 10, when dependent on
10 claim 4 or claim 5, wherein the exhaust outlet opens into the chimney.
12. A waste gas purifying device substantially as hereinbefore described with reference to any of the examples shown in the accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

- 9 -

Application number

9117367.4

Relevant Technical fields

(i) UK CI (Edition K) BIR

(ii) Int CI (Edition 5) BOID

Search Examiner

J H WARREN

Databases (see over)

(i) UK Patent Office

Date of Search

(ii) ONLINE : WPI AND CLAIMS

16 OCTOBER 1991

Documents considered relevant following a search in respect of claims 1-12

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2152838 A (TUCKER) lines 6-14 page 2, DIFFUSER 21 ON BASE OF TANK	1,3
X	GB 1550415 A (SCHAUER) line 64 page 3 - line 3 page 4	1,3,4
X	GB 1537034 A (MARSHALL) DIFFUSER 16, INLET PIPE 12	1,3
Y	GB 0526178 A (CRESPO) Figures 4, 7; lines 107-130 page 2)	1,4,5, 9,10,11
X	GB 0412221 A (NICHOLLS) lines 29-39, DIFFUSER 7 ON BASE OF TANK	1,3
Y	GB 1046787 A (GASPE) GAS INLET 7 PLATE 9	1,3

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Category	Identity of document and relevant passages	Relevance to claim(s)

Categories of documents

- X: Document indicating lack of novelty or of inventive step.
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